

District Energy

SECOND QUARTER 2006

Nashville's New Public-Private Partnership

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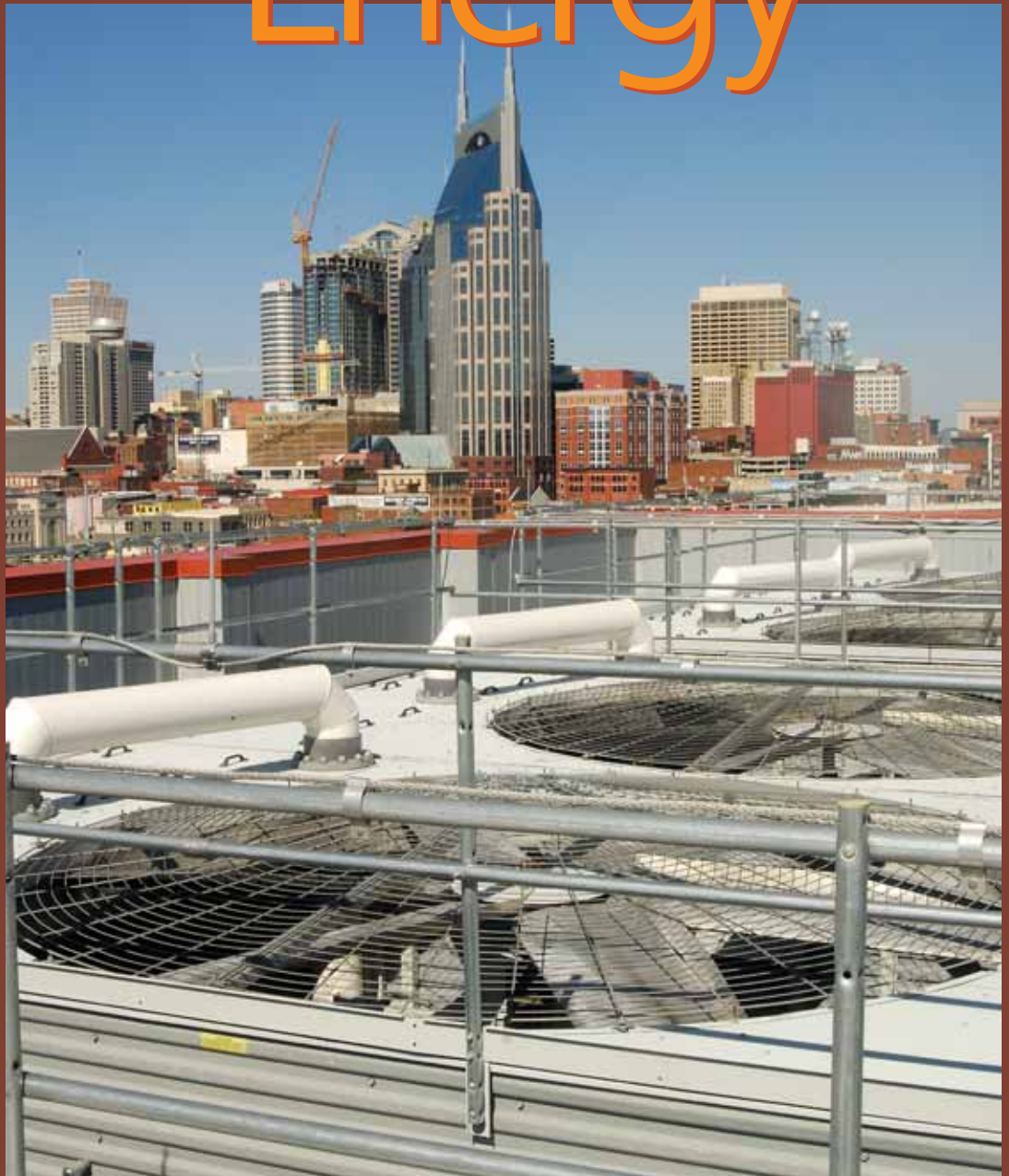
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From Waste to Success:

Saving district energy in Nashville

Harvey W. Gershman, President, Gershman, Brickner & Bratton Inc.

In 1974, when Nashville Thermal Transfer Corp. (Thermal) began service in Nashville, Tenn., it represented an elegant solution for the energy crisis of the mid-1970s. Powered by recovering the energy in municipal solid waste, Thermal avoided dependence on fossil fuel for generating steam and chilled water. For almost 30 years, downtown Nashville relied on waste-to-energy (WTE) to heat and cool as many as 40 downtown commercial and governmental buildings, including those of the Metropolitan Government of Nashville and Davidson County (Metro) and the State of Tennessee.

Struggling to Stay Afloat

When Mayor Bill Purcell took office in 2000, his administration found that the Thermal plant had uncontrolled, escalating costs; poor reliability; and air permit violations. Instead of being self-sufficient with respect to energy product sales and municipal solid waste tipping fees, Thermal was demanding an ever-growing amount of taxpayer subsidy to keep financially afloat. Compounding the reliability and operating cost problems, the pricing of steam and chilled water had been kept below the market value and cost of production, so that a Metro subsidy of more than \$80 million had accumulated since 1976.

An engineering assessment concluded that Thermal's equipment was aging badly and needed an immediate infusion of \$15 million to keep it operational. Moreover, Thermal's inability to attract and convert sufficient waste required the purchase of natural gas to raise steam, defeating the entire rationale for the plant. Morale was low among both management and workers, and there was little budgetary control or accountability.

Although Thermal's customer energy prices were among the lowest for district energy systems across the United States, recent increases had led customers to think that their rates were reasonably close to what their self-heating and -cooling costs would be if they were not served by district energy. Growing customer resistance to further energy price increases meant that Metro could not just raise rates for a Thermal-based solution without a concomitant assurance of better service – something customers were skeptical about ever receiving from Thermal.

Evaluating Options

Facing these problems, the Purcell administration ordered a complete review of the Thermal plant as part of an overall solid waste management plan. The study to determine Thermal's future, begun in July 2000, focused on the evaluation of logical alternatives for the Thermal facility. The ultimate cost of each Thermal option was included in the analysis of Metro's overall waste management costs as well as Metro's cost to continue producing and selling steam and chilled water for its own buildings, either through district energy or other means.

The net cost of Thermal to Metro also included the potential alternative uses of the Thermal site, if it were no longer needed. When the Thermal facility was built, it replaced a variety of unsavory industrial uses far from the heart of downtown. Over the years, however, the downtown expanded to engulf the facility's site, and Thermal became less acceptable as a neighbor. From an environmental perspective as well, the Thermal location raised issues of odor, air quality, traffic generation and aesthetics.

Three alternatives emerged from the analysis of Thermal:

1. Continue using Thermal as a WTE facility, or build a new WTE plant, providing steam and chilled water;
2. Cease Thermal operations and replace it with a new fossil fuel-based facility on a new site to provide steam and chilled water; and
3. Cease Thermal operations and have each building currently served be responsible for its own heating and cooling services.

The option of continuing Thermal included adding a transfer station to rationalize waste hauling and ascribed no value to the property as a site for redevelopment. For the fossil fuel option, Metro needed to find alternative ways to dispose of its waste and assumed out-of-county landfilling for this scenario. Under the cease-operations alternative, customers were to be on their own after a two-year transition period (2000-2002) allowing them to install their own equipment. It was noted by the local utilities serving downtown Nashville, however, that replacing Thermal with natural gas and electricity services for what were then 39 new self-heating and -cooling customers would prove logistically difficult; they made no guarantees about their ability to accomplish required interconnection upgrades nor the cost to do so.

Net present value analyses were run for each of these energy alternatives. The least-cost option, continuing Thermal operations with only a \$15 million rehabilitation, was also the highest-risk alternative, requiring Metro to

rely on a 'patched-up' facility over the long term. When costs for solid waste collection, processing and disposal were added into the analysis, the WTE alternative faded in value. The analysis ultimately concluded that the WTE plant resulted in high-cost waste disposal, undesirable environmental impacts, unacceptable constraints on recycling and high risk factors.

Self-Sufficient New System

These factors led the Purcell administration to decide to end Thermal operations. Keeping Thermal operational didn't offer any long-term savings to Metro, and it posed the risk of continued major financial losses if solid waste tonnages fell short or equipment failed. As a result, the Mayor's solid waste plan called for phasing out Thermal as soon as practicable; implementing a new district energy system, based on natural gas firing and electrical use at a site other than the existing Thermal site; and long-term contracting for solid waste landfilling. It was estimated this solution would save Metro almost \$200 million over the next 20 years.

The goal for the new district energy system was to have it be financially self-sufficient so there would be no cost for Metro over and above the cost of heating and cooling its own buildings. A related goal was to make the pricing for steam and chilled water for all customers less than the cost projected under continued Thermal operations or through self-heating and -cooling alternatives. In addition, the plan made available for redevelopment a choice, 11-acre riverfront property in a key downtown location.

Metro saw this transition as an opportunity to get out of the business of publicly providing heating and cooling services and move toward finding a competent private-



Courtesy Metropolitan Government of Nashville and Davidson County.

The Nashville Thermal Transfer Corp. site before and after plant demolition. After the plant was demolished in 2004, the site was cleared and is slated to become the new home of Nashville's AAA baseball team, the Sounds.



Courtesy Metropolitan Government of Nashville and Davidson County.

sector partner for the system – either to sell the system and just buy services for its buildings, or to maintain ownership and delegate the construction and operations functions to the private partner. To enlist the support and participation of the existing customers in this solution, Metro promised them that they would be protected from uncontrolled price increases and other perceived risks of system privatization.

Because the procurement of a public-private redevelopment of a district energy system is uncommon in the United States, Metro was wary about making procurement choices without knowing the nature and provisions of the private district energy system development community. To address this problem, Metro adopted a two-step procurement process with several opportunities for feedback from the respondents and a great deal of flexibility in its requirements.

The initial step included both a request for expressions of interest (RFEI), which sought answers to questions about the technical, business and contractual preferences of the private bidders, and a request for qualifi-

cations (RFQ), which led to the prequalification of five teams to respond to the second stage of the procurement. The procurement had several consultative aspects to it, including three pre-proposal conferences and private one-on-one discussions with the Metro procurement team. Based in part on strategic information received from the potential bidders, the second step was a formal request for proposals (RFP), which included specific

It was estimated that building a new district energy system would save Metro almost \$200 million over the next 20 years.

technical and financial requirements, model contract terms, a fixed-cost proposal and required technical guarantees.

The RFP's scope of work included the design and construction of a new energy generation facility at a fixed price; the operation and maintenance of the entire system for 15 years (with three five-year Metro options to renew) at a fixed operating price that would escalate annually by an agreed-upon measure

Metro Nashville District Energy System

- Provides steam and chilled water to heat and cool 40 downtown buildings.
- Serves almost 9.8 million sq ft of customer buildings.
- Employs 24 people, including 19 former Nashville Thermal Transfer Corp. employees.
- Pumps steam and chilled water from its energy generation facility to buildings through a four-pipe distribution system of approximately 21,000 ft of underground pipes, both in tunnels and direct-buried (see below).
- Has pipes ranging in diameter from only a half-inch (condensate) to 42 inches (chilled water).
- Operates nine 2,600-ton chillers and four 65,000 lb/hr boilers, giving the system a capacity of 23,400 tons of chilled water and 260,000 lb/hr of steam.
- Circulates roughly 2 million gal of chilled water at any given

time; each minute, up to 42,000 gal of chilled water are pumped through the system.

- Distributes steam through the pipes to downtown buildings at an average rate of 70 mph.
- Counts the State of Tennessee as its largest customer, with the State Capitol and 13 other state buildings on the system.
- Has satisfied customers:

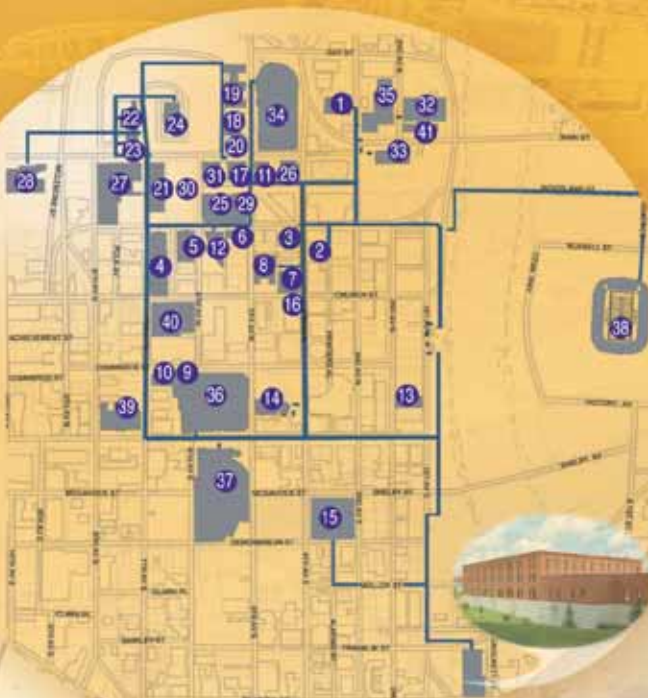
"I was very impressed with the seamless transition from Thermal to DES, and I am continually impressed with its reliability and efficiency."

– Debra Howell, Regions Bank

"The demands on our heating and cooling systems are very complex. DES is always dependable and is a crucial element to keeping our customers and employees comfortable."

– Jim Greer, Gaylord Entertainment Center, home of NHL's Predators

Metro Nashville District Energy System



- | | |
|-----------------------------|-------------------------------|
| 1 Parkway Towers | 21 War Memorial Building |
| 2 South Trust | 22 Library and Archives |
| 3 Union Planters Bank | 23 Supreme Court Building |
| 4 Sheraton Hotel | 24 State Capitol |
| 5 Hermitage Hotel | 25 James K. Polk Building |
| 6 501 Building | 26 Citizen's Plaza Building |
| 7 SunTrust Bank | 27 Tennessee Tower |
| 8 SunTrust Financial Center | 28 Tennessee State University |
| 9 Renaissance Hotel | 29 Tenn. Performing Arts Ctr. |
| 10 Renaissance Office Tower | 30 Legislative Plaza Bldg. |
| 11 St. Mary's Church | 31 Rachel Jackson Bldg. |
| 12 Nashville City Center | 32 A.A. Birch Building |
| 13 Wildhorse Saloon | 33 Metro Courthouse |
| 14 Ryman Auditorium | 34 Municipal Auditorium |
| 15 Nashville Symphony | 35 Criminal Justice Center |
| 16 Viridian Tower | 36 Convention Center |
| 17 Andrew Jackson Building | 37 Gaylord Entertainment Ctr. |
| 18 Central Services | 38 Nashville Coliseum |
| 19 Cordell Hull Building | 39 Hume Fogg School |
| 20 John Sevier Building | 40 Nashville Public Library |
| | 41 Ben West Building |



Metro Nashville District Energy System's energy generation facility was designed to reflect the historic architecture of downtown Nashville.

of inflation; the general business management of the system, including administration, staff development, billing, customer service and marketing; and the operation of the system

fulfilling all environmental standards.

The result of this two-step procurement process was the selection of Constellation Energy Projects and Services (CEPS), the dis-

trict energy subsidiary of the Constellation Energy Group. The parent company of the services subsidiary provided guarantees of the subsidiary's obligations, minimizing Metro's risks on the design, construction and long-term operation of the new facilities.

Metro and CEPS completed their agreement by the end of November 2001, only

Metro saw this transition as an opportunity to move toward finding a competent private-sector partner for the system.

eight months from the issuance of the RFEI/RFQ. The Metro Council approved the contract Jan. 15, 2002 – less than one year from the outset of the procurement. All but four of the existing customers executed new 30-year service contracts for the new entity's services, and those four have subsequently been replaced by other customers.

The key to obtaining the cooperation of

We're proud to congratulate

the City of Nashville's District Energy System for its ongoing recognition and accolades. These awards are a testament to Nashville being home of one of the finest, most successful district energy systems in North America.

2005 Public-Private Partnership Award - Infrastructure Category

2005 ACEC Tennessee Engineering Excellence Award

2003 IDEA Silver: Most square footage signed up for service

2003 IDEA Gold: Most buildings signed up for service



Metro Nashville
DISTRICT ENERGY SYSTEM



We look forward to seeing you at IDEA's 97th Annual Conference & Trade Show in Nashville, Tennessee.



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Gershman, Brickner & Bratton, Inc. is a district energy management consulting firm providing development and support services such as:

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There are nine 2,600-ton chillers in Nashville's new energy generation facility.

the customers was ongoing communication – including frequent meetings, customer representation on the panel evaluating the private-sector proposals and continuous feedback from the Metro team. The new customer contracts were fully negotiated with customer representatives and their counsel, so there was a substantial amount of buy-in

upfront from the major constituencies.

On Sept. 18, 2002, \$66.7 million in Metro system revenue bonds were issued, and ground was broken Nov. 10, 2002, for the new Metro Nashville District Energy System. The new energy generation facility began service Dec. 16, 2003, on budget and six months ahead of schedule. From the

once-innovative Thermal system, Metro executed a public-private partnership to create a new district energy system that is now in its third full year of operation, providing its customers with highly efficient and 100 percent reliable service. The entire process of systemwide assessment, design-build-operate procurement and public-private management has allowed downtown Nashville to save district energy and recapture all the financial, operational and environmental benefits for future generations. 



Harvey W. Gershman, president of Gershman, Brickner & Bratton Inc., has been active in the solid waste management field as an advisor to government and industry for more than 30 years. He has managed market studies, cost and feasibility analyses, contract development and negotiations, contractor procurements, marketing, project development and project financing activities. Many of his assignments have included development of waste-to-energy and district energy system projects. Gershman currently serves as project administrator for the Metropolitan Government of Nashville and Davidson County for the redevelopment of Nashville's district energy system. He can be reached at hgershman@gbinc.com.



“Constellation Energy helps keep my tenants and the City of Nashville comfortable year-round.”

RICHARD FLETCHER, CHAIRMAN
DOWNTOWN NASHVILLE
ENERGY COALITION

What do Tennessee Titans fans, Grand Ole Opry audiences, Tennessee State University students, and thousands of Nashville conventioners, office workers and hotel guests have in common? Constellation Energy keeps all of them comfortable. Ahead of schedule, Constellation delivered a new state-of-the-art energy system to provide steam and chilled water for heating and cooling almost 40 major buildings in the Tennessee capital's downtown district. As operator and manager of the new system, Constellation now is committed to providing year-round comfort to the people and businesses of Nashville for years to come. Now that's the way to keep "Music City USA" humming!
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